

SEQUENCE LISTING

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<110> Thorner, Jeremy
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Torrance, Pamela
Casamayor, Antonio

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Phe Asp Val Thr Arg Lys Leu Pro Tyr Leu Lys Ile Asp Val Phe Ala
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 Phe Asp Ser Ala Ala Ser Ile Arg Leu Tyr Asn His His Trp Ile Thr
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 Ile Gly Lys Gly Ser Phe Gly Lys Val Met Gln Val Arg Lys Lys Asp
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 Thr Gln Lys Val Tyr Ala Leu Lys Ala Ile Arg Lys Ser Tyr Ile Val
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Arg Val Asp Cys Pro Phe Ile Val Pro Leu Lys Phe Ser Phe Gln Ser
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 Pro Glu Lys Leu Tyr Phe Val Leu Ala Phe Ile Asn Gly Gly Glu Leu
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 □
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 Phe Tyr His Leu Gln Lys Glu Gly Arg Phe Asp Leu Ser Arg Ala Arg
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 □
 Phe Tyr Thr Ala Glu Leu Leu Cys Ala Leu Asp Asn Leu His Lys Leu
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 Asp Val Val Tyr Arg Asp Leu Lys Pro Glu Asn Ile Leu Leu Asp Tyr
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 Tyr Tyr Asp Glu Asp Val Pro Lys Met Tyr Lys Lys Ile Leu Gln Glu
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Pro Leu Val Phe Pro Asp Gly Phe Asp Arg Asp Ala Lys Asp Leu Leu
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 Ile Gly Leu Leu Ser Arg Asp Pro Thr Arg Arg Leu Gly Tyr Asn Gly
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Cys Lys His Pro Glu Val Gln Ser Tyr Leu Lys Ile Ser Gln Pro Gln
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Glu Pro Glu Leu Met Asn Ala Asn Pro Ser Pro Pro Pro Ser Pro Ser
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Gln Gln Ile Asn Leu Gly Pro Ser Ser Asn Pro His Ala Lys Pro Ser
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Asp Phe His Phe Leu Lys Val Ile Gly Lys Gly Ser Phe Gly Lys Val
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Leu Leu Ala Arg His Lys Ala Glu Glu Ala Phe Tyr Ala Val Lys Val
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Leu Gln Lys Lys Ala Ile Leu Lys Lys Lys Glu Glu Lys His Ile Met
130 135 140
Ser Glu Arg Asn Val Leu Leu Lys Asn Val Lys His Pro Phe Leu Val
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☐ Gly Leu His Phe Ser Phe Gln Thr Ala Asp Lys Leu Tyr Phe Val Leu
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☐
☐ Asp Tyr Ile Asn Gly Gly Glu Leu Phe Tyr His Leu Gln Arg Glu Arg
☐ 180 185 190
☐
☐ Cys Phe Leu Glu Pro Arg Ala Arg Phe Tyr Ala Ala Glu Ile Ala Ser
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☐
☐ Ala Leu Gly Tyr Leu His Ser Leu Asn Ile Val Tyr Arg Asp Leu Lys
☐ 210 215 220
☐
☐ Pro Glu Asn Ile Leu Leu Asp Ser Gln Gly His Ile Val Leu Thr Asp
☐ 225 230 235 240
☐
☐ Phe Gly Leu Cys Lys Glu Asn Ile Glu His Asn Gly Thr Thr Ser Thr
☐ 245 250 255
☐
☐ Phe Cys Gly Thr Pro Glu Tyr Leu Ala Pro Glu Val Leu His Lys Gln
☐ 260 265 270
☐
☐ Pro Tyr Asp Arg Thr Val Asp Trp Trp Cys Leu Gly Ala Val Leu Tyr
☐ 275 280 285
☐
☐ Glu Met Leu Tyr Gly Leu Pro Pro Phe Tyr Ser Arg Asn Thr Ala Glu
☐ 290 295 300
☐
☐ Met Tyr Asp Asn Ile Leu Asn Lys Pro Leu Gln Leu Lys Pro Asn Ile
☐ 305 310 315 320
☐

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□
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Thr Lys Arg Leu Gly Ala Lys Asp Asp Phe Met Glu Ile Lys Ser His
□
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□
Ile Phe Phe Ser Leu Ile Asn Trp Asp Asp Leu Ile Asn Lys Lys Ile
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□
□
Thr Pro Pro Phe Asn Pro Asn Val Ser Gly Pro Ser Asp Leu Arg His
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□
□
Phe Asp Pro Glu Phe Thr Glu Glu Pro Val Pro Ser Ser Ile Gly Arg
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□
□
Ser Pro Asp Ser Ile Leu Val Thr Ala Ser Val Lys Glu Ala Ala Glu
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Ala Ser Pro Gln Gly Gln Phe Gly Glu Lys Ala Leu Thr Ser Thr Asn
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Ala	Ser	Leu	Tyr
Phe	Leu	Leu	Glu
Tyr	Ala	Pro	His
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Gly	Leu	Ile	Lys
Lys	Tyr	Gly	Ser
Leu	Asn	Glu	Thr
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Tyr	Ala	Ser	Gln
Ile	Ile	Asp	Ala
Val	Asp	Ser	Leu
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Ile	Ile	His	Arg
Asp	Ile	Lys	Pro
Glu	Asn	Ile	Leu
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Lys	Pro	Tyr	Phe
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Phe	Val	Gly	Thr
Ala	Glu	Tyr	Val
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Tyr	Thr	Asp	Ser
Arg	Cys	Asp	Ile
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Gln	Met	Leu	Ala
Gly	Lys	Pro	Pro
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Asn	Glu	Tyr	Leu
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Val	Met	Lys	Ile
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Thr	Ala	Gly	Phe
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Lys	Asp	Leu	Val
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Asn	Asp	Arg	Leu
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Ile	Gln	Pro	Tyr
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Ser	Gln	Pro	Lys
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Ser	Asn	Asn	Thr
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Lys	Pro	Lys	Val
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 Asp Val Ala Ser Asp Leu Ile Lys Lys Leu Leu Val Leu Asp Pro Lys
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 Ile Lys Phe Asp Asn Thr Leu Trp Glu Leu Pro Pro Pro Arg Leu Lys
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□

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□

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30

□

□

Pro Gln Ser Ser Asn Val Val Pro Gly Thr Ser His Ile Gly Ser Ile

□

35

40

45

□

□

Lys Ser Pro Ala Asp Tyr Val Phe Gly Asp Ile Ile Gly Asp Gly Ser

□

50

55

60

□

□

Phe Ser Lys Val Arg Arg Ala Thr Asp Lys Lys Ser Trp Lys Glu Tyr

□

65

70

75

80

□

□

Ala Ile Lys Val Leu Asp Lys Lys Tyr Ile Val Lys Glu Asn Lys Val

□

85

90

95

□

□

Lys Tyr Val Asn Ile Glu Arg Asp Ser Met Met Arg Leu Asn Gly Phe

□

100

105

110

□

□

Pro Gly Ile Ser Arg Leu Phe His Thr Phe Gln Asp Asp Leu Lys Leu

□

115

120

125

□

□

Tyr Tyr Val Leu Glu Leu Ala Pro Asn Gly Glu Leu Leu Gln Tyr Ile

□

130

135

140

□

□

Lys Lys Tyr Arg Phe Leu Asp Glu Asn Cys Val Arg Phe Tyr Ala Ala

□

145

150

155

160

□

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☐ Arg Asp Leu Lys Pro Glu Asn Ile Leu Phe Asp Gly Asn Met His Val
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☐ Lys Ile Thr Asp Phe Gly Thr Ala Lys Ile Leu Pro Pro Lys Tyr Val
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☐ Ser Pro Pro Phe His Gly Ser Asn Pro Asn Asn Ile Phe Lys Lys Ile
☐ 260 265 270
☐
☐ Met Ser Leu Glu Tyr Glu Leu Pro Lys Leu Leu Pro Pro Asp Ile Val
☐ 275 280 285
☐
☐ Pro Leu Phe Ser His Leu Phe Arg Ile Gln Pro Ser Asp Arg Ser Thr
☐ 290 295 300
☐
☐ Thr Gln Gln Ile Lys Gln Phe Pro Phe Phe Ala Thr Ile Thr Trp Asp
☐ 305 310 315 320
☐

□
Asn Leu Trp Thr Gln Asp Pro Pro Pro Met Gln Ser Phe Arg Pro Asn
□
325 330 335

□
□
Tyr Asn Ile Ala Ile Pro Asn Ala Pro Ala Tyr Tyr Arg Ser Asn Val
□
340 345 350

□
Thr Ala Ala Ala Ala Ala Asn Ala Ala Ala Ala Phe Ala Ser Ala Ser
□
355 360 365

□
Ile Val Lys His Gln Glu Thr Ala Arg Arg Gln Glu Leu Pro Thr Val
□
370 375 380

□
Asn Arg Phe Thr Ala Pro Thr Ala His Tyr Gly Tyr Ala Ser Leu Arg
□
385 390 395 400

□
Ser His Gln Met Pro Val Asp Arg Leu Tyr Tyr Lys Leu Val Pro Ser
□
405 410 415

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Ser Glu Ser Ile
□
420

□

□

□

□

□

<210> 50

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<211> 491

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<212> PRT

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<213> Unknown

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☐
 Asn Ser Ser Asn Gly Ala Asn Val Ser Arg Ser Lys Ser Phe Ser Phe
☐
 20 25 30
☐
☐
 Lys Ala Pro Gln Glu Asn Phe Thr Ser His Asp Phe Glu Phe Gly Lys
☐
 35 40 45
☐
☐
 Ile Tyr Gly Val Gly Ser Tyr Ser Lys Val Val Arg Ala Lys Lys Lys
☐
 50 55 60
☐
☐
 Glu Thr Gly Thr Val Tyr Ala Leu Lys Ile Met Asp Lys Lys Phe Ile
☐
 65 70 75 80
☐
☐
 Thr Lys Glu Asn Lys Thr Ala Tyr Val Lys Leu Glu Arg Ile Val Leu
☐
 85 90 95
☐
☐
 Asp Gln Leu Glu His Pro Gly Ile Ile Lys Leu Tyr Phe Thr Phe Gln
☐
 100 105 110
☐
☐
 Asp Thr Ser Ser Leu Tyr Met Ala Leu Glu Ser Cys Glu Gly Gly Glu
☐
 115 120 125
☐
☐
 Leu Phe Asp Gln Ile Thr Arg Lys Gly Arg Leu Ser Glu Asp Glu Ala
☐
 130 135 140
☐
☐
☐
 Arg Phe Tyr Thr Ala Glu Val Val Asp Ala Leu Glu Tyr Ile His Ser
☐

145 150 155 160
☐
☐
 Met Gly Leu Ile His Arg Asp Ile Lys Pro Glu Asn Leu Leu Leu Thr
☐
 165 170 175
☐
☐
 Ser Asp Gly His Ile Lys Ile Ala Asp Phe Gly Ser Val Lys Pro Met
☐
 180 185 190
☐
☐
 Gln Asp Ser Gln Ile Thr Val Leu Pro Asn Ala Ala Ser Asp Asp Lys
☐
 195 200 205
☐
☐
 Ala Cys Thr Phe Val Gly Thr Ala Ala Tyr Val Pro Pro Glu Val Leu
☐
 210 215 220
☐
☐
 Asn Ser Ser Pro Ala Thr Phe Gly Asn Asp Leu Trp Ala Leu Gly Cys
☐
 225 230 235 240
☐
☐
 Thr Leu Tyr Gln Met Leu Ser Gly Thr Ser Pro Phe Lys Asp Ala Ser
☐
 245 250 255
☐
☐
 Glu Trp Leu Ile Phe Gln Arg Ile Ile Ala Arg Asp Ile Lys Phe Pro
☐
 260 265 270
☐
☐
 Asn His Phe Ser Glu Ala Ala Arg Asp Leu Ile Asp Arg Leu Leu Asp
☐
 275 280 285
☐
☐
 Thr Glu Pro Ser Arg Arg Pro Gly Ala Gly Ser Glu Gly Tyr Val Ala
☐
 290 295 300
☐
☐
 Leu Lys Arg His Pro Phe Phe Asn Gly Val Asp Trp Lys Asp Leu Arg
☐

305					310					315						320
	Ser	Gln	Thr	Pro	Pro	Lys	Leu	Ala	Pro	Asp	Pro	Ala	Ser	Gln	Thr	Ala
					325					330					335	
	Ser	Pro	Glu	Arg	Asp	Asp	Thr	His	Gly	Ser	Pro	Trp	Asn	Leu	Thr	His
				340					345					350		
	Ile	Gly	Asp	Ser	Leu	Ala	Thr	Gln	Asn	Glu	Gly	His	Ser	Ala	Pro	Pro
			355					360					365			
	Thr	Ser	Ser	Glu	Ser	Ser	Gly	Ser	Ile	Thr	Arg	Leu	Ala	Ser	Ile	Asp
		370					375					380				
	Ser	Phe	Asp	Ser	Arg	Trp	Gln	Gln	Phe	Leu	Glu	Pro	Gly	Glu	Ser	Val
	385					390					395					400
	Leu	Met	Ile	Ser	Ala	Val	Lys	Lys	Leu	Gln	Lys	Ile	Thr	Ser	Lys	Lys
					405					410					415	
	Val	Gln	Leu	Ile	Leu	Thr	Asn	Lys	Pro	Lys	Leu	Ile	Tyr	Val	Asp	Pro
				420					425					430		
	Ser	Lys	Leu	Val	Val	Lys	Gly	Asn	Ile	Ile	Trp	Ser	Asp	Asn	Ser	Asn
			435					440					445			
	Asp	Leu	Asn	Val	Val	Val	Thr	Ser	Pro	Ser	His	Phe	Lys	Ile	Cys	Thr
		450					455					460				
	Pro	Lys	Lys	Val	Leu	Ser	Phe	Glu	Asp	Ala	Lys	Gln	Arg	Ala	Ser	Val

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 Trp Lys Lys Ala Ile Glu Thr Leu Gln Asn Arg
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 485 490
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 Asp Asp Gly Ser Ser Glu Asp Glu Asn Glu Lys Ser Trp Gly Asn Gly
☐
 20 25 30
☐
☐
 Leu Phe His Phe His His Gly Glu Lys His His Asp Gly Ser Pro Lys
☐
 35 40 45
☐
☐
 Asn His Asn His Glu His Glu His His Ile Arg Lys Ile Asn Thr Asn
☐
 50 55 60
☐
☐
 Glu Thr Leu Pro Ser Ser Leu Ser Ser Pro Lys Leu Arg Asn Asp Ala
☐
 65 70 75 80
☐
☐
 Ser Phe Lys Asn Pro Ser Gly Ile Gly Asn Asp Asn Ser Lys Ala Ser
☐
 85 90 95
☐
☐

Glu Arg Lys Ala Ser Gln Ser Ser Thr Glu Thr Gln Gly Pro Ser Ser
 □
 100 105 110
 □
 □
 Glu Ser Gly Leu Met Thr Val Lys Val Tyr Ser Gly Lys Asp Phe Thr
 □
 115 120 125
 □
 □
 Leu Pro Phe Pro Ile Thr Ser Asn Ser Thr Ile Leu Gln Lys Leu Leu
 □
 130 135 140
 □
 □
 Ser Ser Gly Ile Leu Thr Ser Ser Ser Asn Asp Ala Ser Glu Val Ala
 □
 145 150 155 160
 □
 □
 Ala Ile Met Arg Gln Leu Pro Arg Tyr Lys Arg Val Asp Gln Asp Ser
 □
 165 170 175
 □
 □
 Ala Gly Glu Gly Leu Ile Asp Arg Ala Phe Ala Thr Lys Phe Ile Pro
 □
 180 185 190
 □
 □
 Ser Ser Ile Leu Leu Pro Gly Ser Thr Asn Ser Ser Pro Leu Leu Tyr
 □
 195 200 205
 □
 □
 Phe Thr Ile Glu Phe Asp Asn Ser Ile Thr Thr Ile Ser Pro Asp Met
 □
 210 215 220
 □
 □
 Gly Thr Met Glu Gln Pro Val Phe Asn Lys Ile Ser Thr Phe Asp Val
 □
 225 230 235 240
 □
 □
 Thr Arg Lys Leu Arg Phe Leu Lys Ile Asp Val Phe Ala Arg Ile Pro
 □
 245 250 255
 □
 □

Ser Leu Leu Leu Pro Ser Lys Asn Trp Gln Gln Glu Ile Gly Glu Gln
 □
 260 265 270
 □
 □
 Asp Glu Val Leu Lys Glu Ile Leu Lys Lys Ile Asn Thr Asn Gln Asp
 □
 275 280 285
 □
 □
 Ile His Leu Asp Ser Phe His Leu Pro Leu Asn Leu Lys Ile Asp Ser
 □
 290 295 300
 □
 □
 Ala Ala Gln Ile Arg Leu Tyr Asn His His Trp Ile Ser Leu Glu Arg
 □
 305 310 315 320
 □
 □
 Gly Tyr Gly Lys Leu Asn Ile Thr Val Asp Tyr Lys Pro Ser Lys Asn
 □
 325 330 335
 □
 □
 Lys Pro Leu Ser Ile Asp Asp Phe Asp Leu Leu Lys Val Ile Gly Lys
 □
 340 345 350
 □
 □
 Gly Ser Phe Gly Lys Val Met Gln Val Arg Lys Lys Asp Thr Gln Lys
 □
 355 360 365
 □
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 Ile Tyr Ala Leu Lys Ala Leu Arg Lys Ala Tyr Ile Val Ser Lys Cys
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 370 375 380
 □
 □
 Glu Val Thr His Thr Leu Ala Glu Arg Thr Val Leu Ala Arg Val Asp
 □
 385 390 395 400
 □
 □
 Cys Pro Phe Ile Val Pro Leu Lys Phe Ser Phe Gln Ser Pro Glu Lys
 □
 405 410 415
 □
 □

Leu Tyr Leu Val Leu Ala Phe Ile Asn Gly Gly Glu Leu Phe Tyr His
 □
 420 425 430
 □
 □
 Leu Gln His Glu Gly Arg Phe Ser Leu Ala Arg Ser Arg Phe Tyr Ile
 □
 435 440 445
 □
 □
 Ala Glu Leu Leu Cys Ala Leu Asp Ser Leu His Lys Leu Asp Val Ile
 □
 450 455 460
 □
 □
 Tyr Arg Asp Leu Lys Pro Glu Asn Ile Leu Leu Asp Tyr Gln Gly His
 □
 465 470 475 480
 □
 □
 Ile Ala Leu Cys Asp Phe Gly Leu Cys Lys Leu Asn Met Lys Asp Asn
 □
 485 490 495
 □
 □
 Asp Lys Thr Asp Thr Phe Cys Gly Thr Pro Glu Tyr Leu Ala Pro Glu
 □
 500 505 510
 □
 □
 Ile Leu Leu Gly Gln Gly Tyr Thr Lys Thr Val Asp Trp Trp Thr Leu
 □
 515 520 525
 □
 □
 Gly Ile Leu Leu Tyr Glu Met Met Thr Gly Leu Pro Pro Tyr Tyr Asp
 □
 530 535 540
 □
 □
 Glu Asn Val Pro Val Met Tyr Lys Lys Ile Leu Gln Gln Pro Leu Leu
 □
 545 550 555 560
 □
 □
 Phe Pro Asp Gly Phe Asp Pro Ala Ala Lys Asp Leu Leu Ile Gly Leu
 □
 565 570 575
 □
 □

Leu Ser Arg Asp Pro Ser Arg Arg Leu Gly Val Asn Gly Thr Asp Glu

□

580

585

590

□

□

Ile Arg Asn His Pro Phe Phe Lys Asp Ile Ser Trp Lys Lys Leu Leu

□

595

600

605

□

□

Leu Lys Gly Tyr Ile Pro Pro Tyr Lys Pro Ile Val Lys Ser Glu Ile

□

610

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620

□

□

Asp Thr Ala Asn Phe Asp Gln Glu Phe Thr Lys Glu Lys Pro Ile Asp

□

625

630

635

640

□

□

Ser Val Val Asp Glu Tyr Leu Ser Ala Ser Ile Gln Lys Gln Phe Gly

□

645

650

655

□

□

Gly Trp Thr Tyr Ile Gly Asp Glu Gln Leu Gly Asp Ser Pro Ser Gln

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660

665

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Gly Arg Ser Ile Ser

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675

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<211> 17

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<212> PRT

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10

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□

□

Glu

□

□

□

□

<210> 53

□

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<213> Artificial Sequence

□

□

<220>

□

<223> Description of Artificial Sequence:peptide

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□

<400> 53

□

Phe Pro Gln Phe Ser Tyr Ser Ala Ser

□

1

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□

□

□

<210> 54

□

<211> 17

□

<212> PRT

□

<213> Artificial Sequence

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<223> Description of Artificial Sequence:peptide

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Glu

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<211> 9

<212> PRT

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Phe Leu Gly Phe Ser Tyr Ala Pro Pro

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<210> 56

<211> 17

<212> PRT

<213> Artificial Sequence

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Gly Thr Val Thr His Thr Phe Cys Gly Thr Ile Glu Tyr Met Ala Pro

1 5 10 15

□

□

Glu

□

□

□

□

<210> 57

□

<211> 9

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<212> PRT

□

<213> Artificial Sequence

□

□

<220>

□

<223> Description of Artificial Sequence:peptide

□

□

<400> 57

□

Phe Leu Gly Phe Thr Tyr Val Ala Pro

□

1

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□

□

□

<210> 58

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<211> 17

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<212> PRT

□

<213> Artificial Sequence

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<223> Description of Artificial Sequence:peptide

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□

<400> 58

□

Asp Ala Lys Thr Asn Thr Phe Cys Gly Thr Pro Asp Tyr Ile Ala Pro

□

1

5

10

15

□

☐
Glu
☐

☐

☐

☐

<210> 59

☐

<211> 9

☐

<212> PRT

☐

<213> Artificial Sequence

☐

☐

<220>

☐

<223> Description of Artificial Sequence:peptide

☐

☐

<400> 59

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Phe Arg Asn Phe Ser Phe Met Asn Pro

☐

1 5

☐

☐

☐

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<212> PRT

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Asp Asp Lys Thr Asp Thr Phe Cys Gly Thr Pro Glu Tyr Leu Ala Pro

☐

1 5 10 15

☐

☐

Glu

☐

☐

☐

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<210> 61

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Asn Asp Lys Thr Asp Thr Phe Cys Gly Thr Pro Glu Tyr Leu Ala Pro

☐

1 5 10 15

☐

☐

Glu

☐

□

□

□

<210> 63

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<223> Description of Artificial Sequence:peptide

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Phe Gly Gly Trp Thr Tyr Ile Gly

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1 5

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<212> PRT

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<213> Artificial Sequence

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Gly Asn Arg Thr Ser Thr Phe Cys Gly Thr Pro Glu Phe Met Ala Pro

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1 5 10 15

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Glu

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<213> Artificial Sequence

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<223> Description of Artificial Sequence:peptide

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<400> 65

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Phe Arg Gly Phe Ser Phe Met Pro Asp

□

1 5

□

□

□

<210> 66

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<211> 17

□

<212> PRT

□

<213> Artificial Sequence

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<223> Description of Artificial Sequence:peptide

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□

<400> 66

□

Lys Asp Arg Thr Asn Thr Phe Cys Gly Thr Thr Glu Tyr Leu Ala Pro

□

1 5 10 15

□

□

Glu

□

□

□

□

<210> 67

□

<211> 9

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□

<400> 67

□

Phe Ala Gly Phe Thr Phe Val Asp Glu

□

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□

□

□

□